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COURTSHIP AMONG THE FLIES.

J. M. ALDRICH.¹

The dipterous family Dolichopodidae perhaps surpasses all other families of animals in the variety and complexity of the sexual adornments of the males. These structures occur in some species in the tarsi, in others in the antennæ, face, wings, or other parts. Probably three-fourths of the species offer well-marked peculiarities which distinguish the male at a glance.

In the genus *Dolichopus*, the males are usually provided with tarsal ornaments, usually on the fore limbs. A new species, to which the following remarks apply, has the fore tarsi in the male exceedingly elongated and slender, with the last joint in the shape of a comparatively large, oval, black disk. In none of the numerous other species known to me is the attenuation of the first three joints so great. The tarsi of the female are of the ordinary simple structure.

This species is abundant about the edges of the streams, on the wet, bare earth, at Moscow, Idaho. I observed in September the maneuvers of the male in courting the female. He would place himself directly in front of her, at a distance of about half an inch, with his face toward her. He would then rapidly vibrate his wings, holding them horizontally, at right angles to the body, and at the same time would give these fore feet an up-and-down motion, raising them simultaneously above the level of the head and bringing them down with a slight force upon the ground, the movement recurring in a measured way in about half a second. This he would continue for some ten seconds; then, rising on the wing, he would swiftly make a small semicircle in the air and attempt to alight upon the female. In the large number of cases that I observed, he was always unsuccessful, the female hastily moving away a few inches, when the male would usually alight before her and repeat the movements just described. On account of the numbers that were engaged in this occupation on the same small area, I could not be certain that the same male always

¹ Moscow, Idaho.

attended upon a given female; but there can be no doubt that the females are exceedingly slow to accept the males, for I saw the above maneuver repeated hundreds of times with the same result.

In company with the species just mentioned occurred considerable numbers of a species of *Hygroceleuthus*, which I have referred to (Kans. Univ. Quarterly, II., 24) as a variety of *H. crenatus* O. S. These were engaged in a similar occupation. The male of this species has only plain tarsi, but differs from the female in having the antennal joints longer, the first two with coarse black hair, and the arista of the third short and heavily covered with black pubescence; the face is also longer, the wings broader, and the cilia of the tegulæ, instead of being coarse and chiefly black, are fine and white. The male hovers in the air before the female at a distance of one or two inches, occasionally making a slight darting motion towards her. In this position the peculiarities of his face and antennæ are shown to the best advantage. The breadth of the wings is probably of advantage only in facilitating this hovering process, and the structure of the tegular cilia may possibly be accounted for by supposing that it is simply in compensation for the increased growth of wings. This male, after hovering a few seconds, describes a semi-circle in flight and attempts to alight upon the female as in the foregoing species, and with the same results. I observed the copulation only once, and then did not see the preliminaries.

I was much impressed by the perfect coincidence of these observations with Darwin's theory of sexual selection. The reluctance of the females, and the corresponding ardor and persistence of the males, is carried to an almost incredible limit.

In this connection the observations of Fr. Dahl (Zool. Anzeig., April, 1889) on another species of *Dolichopus* are of interest. I translate from a quotation in an article by Dr. W. M. Wheeler (Proc. Wis. Nat. Hist. Soc., April, 1889, p. 209), which mentions a somewhat similar habit in a gall-gnat *Asynapta antennariæ* Wheeler).

"The male species of fly, *Dolichopus plumipes* possesses on first tarsal joint of the middle legs a beautiful, regular fringe,

the purpose of which is not immediately perceptible, as the flattened hairs could not possibly serve to grasp the female. I have now observed the pairing of these insects, and am convinced that the structure serves as an actual ornament to the male, like the highly developed tail-feathers, etc., of a male bird. The male came flying up, and hovered for a time so close over the quietly-resting female that the fringed tarsi hung down immediately before her eyes. After some time copulation was attempted, but the female at once showed unwillingness. Only after repeated attempts did he succeed in gaining her acceptance."